NASA

Lyndon B. Johnson Space Center

REPORT

ON

SOLID WASTE MANAGEMENT UNITS

AND

ASSESSMENT OF RELEASES OF HAZARDOUS WASTE

OR

HAZARDOUS CONSTITUENTS

Houston, Texas
April 2, 1985

943407

A Report Prepared for:

National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas

through
Pan Am World Services
Houston, Texas

AREA EVALUATION
COMPLIANCE WITH THE
1984 REAUTHORIZATION OF RCRA
SECTION 3004(u) AND (v)

HLA Job No. 17313,009.12

by

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April 2, 1985

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EXECUTIVE SUMMARY

During the PA/SI, it was determined that existing JSC file documentation is sufficiently complete to allow an evaluation of JSC waste management practices and activities. Few records were available for the period between 1962 and 1972; however, many of the post-1972 records gave reference to activities during the 1962 to 1972 period. Records exist that document JSC utilizing permitted commercial disposal facilities continuously since 1970. Use of off-site commercial disposal of the photographic processing is documented as early as 1967 by cross-referencing records with personnel interviews.

Formal and informal reporting requirements at JSC provide detailed records of spills and activities which occurred subsequent to the spill discovery. In many cases, records detailing what occurred were found in three sets of files, each prepared by different individuals and found in different locations (i.e., maintenance, operations, and laboratory). Thus, it was possible to review these incidents through observations made by different individuals. These files, when cross-referenced, usually provided very detailed information.

Available files are not sufficiently detailed to determine whether releases of waste materials to ground waters may have occurred from the surface impoundments and underground storage tanks.

In summary, JSC and its personnel have reacted to incidents and initiated response activities in accordance with the generally accepted practices of the industry at the time of the incident. Waste management handling and disposal activities have equalled or exceeded regulatory requirements and industry practices during the various time periods.

I INTRODUCTION

This report was developed to meet provisions of the Solid and Hazardous Waste Amendments as established in the new Section 3004(u) of the Resource Conservation and Recovery Act (Section 206 of the Amendments), as follows:

> "Standards promulgated under this section shall require, and a permit issued after the date of enactment of the Hazardous and Solid Waste Amendments of 1984 by the Administrator or a State shall require, corrective action for all releases of hazardous waste or constituents from any solid waste management unit at a treatment, storage or disposal facility seeking a permit under this subtitle, regardless of the time at which waste was placed in such unit. Permits issued under section 3005 shall contain schedules of compliance for such corrective action (where such corrective action cannot be completed prior to issuance of the permit) and assurances of financial responsibility for completing such corrective action."

The National Aeronautics and Space Administration's Lyndon B. Johnson Space Center (JSC) was notified that compliance with Section 3004(u) and (v) would be required by the Texas Department of Health (TDH). Notification of this requirement was sent to JSC by TDH via certified mail dated February 15, 1985, and was subsequently received by JSC on February 19, 1985. This TDH transmittal requested that, within 45 days of receipt of the letter, JSC submit a report to TDH which identifies all solid waste management units at JSC and any releases of hazardous wastes or constituents that may have occurred (see Attachment 1).

On February 27, 1985, JSC, through Pan Am World Services, retained Harding Lawson Associates (HLA) to assist in the development of the required report. At that time, HLA implemented:

- A review of available draft documents concerning the intent of the requirements of Section 3004(u) and (v);
- A series of group and individual meetings with JSC and JSC contract personnel who are familiar with operating and closed waste management facilities and practices; and
- A detailed review of applicable management files.

During the initial phase of activities, HLA determined that the scope of the new 3004(u) provision is defined by how certain key terms are applied. These terms are:

- Standard for Action: Protection of human health and the environment - this term is interpreted to mean that a corrective measure would be addressed when there is a known or probable release posing a threat to human health and the environment. In the case of ground water, a substantial threat would be assumed if a release from a solid waste management unit exceeds the ground-water protection standard contained in 40 CFR 264.92.
- Release - is interpreted to include those wastes or constituents identified in 40 CFR 261, and those listed in Appendix VIII of Part 261. A release would include any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, but would exclude releases otherwise permitted or authorized under law.
- Solid Waste Management Unit - is interpreted to include landfills, surface impoundments, waste piles, land treatment units, incinerators, injection wells, tanks (including 90-day accumulation tanks), container storage areas, transfer stations, and waste recycling operations. Additionally, this interpretation is extended to include active and inactive units containing either hazardous wastes or solid wastes (as defined in 40 CFR 261.2).

- Spills - is interpreted to include spills of hazardous wastes which occurred since November 19, 1980, and were not cleaned up.
- Facility - is interpreted to include all contiguous property under the control of JSC as of November 8, 1984.

The U.S. Environmental Protection Agency (EPA) has recommended a three-stage implementation process for compliance with the 3004(u) provisions, with each stage consisting of specific steps, as follows:

- Stage I - Assessment of need for corrective measures
  - Step 1: Submission of Part B information by applicant
  - Step 2: Preliminary assessment/site investigation
- Stage II - Remedial investigations and development of proposed programs of corrective measures
  - Step 1: Remedial investigations by owner/operator to identify/characterize releases
  - Step 2: Development of a proposed program of corrective measures and cost estimate
- Stage III - Selecting and performing corrective measures
  - Step 1: Establishing the program for corrective measures
  - Step 2: Demonstration of financial assurance
  - Step 3: Conducting corrective measures

This report was developed to comply with Stage I requirements and includes evaluations to allow TDH and JSC to determine which specific findings in Stage I could require the subsequent development of Stage II and III activities.

The Stage I assessments were divided into two steps. Step 1 included providing an identification of each solid waste management unit at JSC which includes the following:

- Type of unit;
- Location of each unit on a facility map;
- General dimensions (if available);
- When unit was operated; and
- Description of wastes that were placed in unit (if available).

The above-listed information for active RCRA regulated units was included in the draft RCRA Part B permit application submitted to TDH on February 14, 1985. This report will satisfy the Stage I, Step 1 requirements for abandoned or closed solid waste management units and applicable spills, as defined by the EPA. Applicable spills include any spills over 5 gallons since November 1980. Specific information concerning these units was not included in the previously submitted RCRA Part B permit application because the application was prepared prior to draft interpretations of the 1984 changes to RCRA.

Step 2 of Stage I includes the performance of a preliminary assessment/site investigation (PA/SI) to determine whether or not a release that poses a threat to human health and the environment has occurred, or if there is a likelihood that such a release has occurred. The preliminary assessment (PA) was divided into two tasks. Task A included performing approximately ten interviews with

JSC or JSC contractor personnel who are knowledgeable of waste management practices or spill response activities. Task B included performing detailed file reviews concerning:

- Waste management and operations, 1972 to present;
- TDH monthly and annual waste summaries, 1977 to present;
- Shipping manifests (TDWR Waste Shipping Control Tickets, 1977 to present);
- Transporters bills of lading, 1977 to present;
- Annual waste shipment records, 1972 to 1984;
- JSC waste release incident reports;
- JSC pollution control procedures;
- TDH inspection reports;
- On-site waste movement tickets;
- Various laboratory activities; and
- JSC Pollution Control Committee Files, 1970 to 1984.

Following these Preliminary Assessment (PA) activities, a site investigation (SI) was performed which included a visual inspection of existing waste management units, closed waste management units, and spill areas. During the SI, specific observations were made to identify any adverse or potentially adverse effects to the environment resulting from the unit or spill area (i.e., dead vegetation, discoloration, ground depression or swell, etc.).

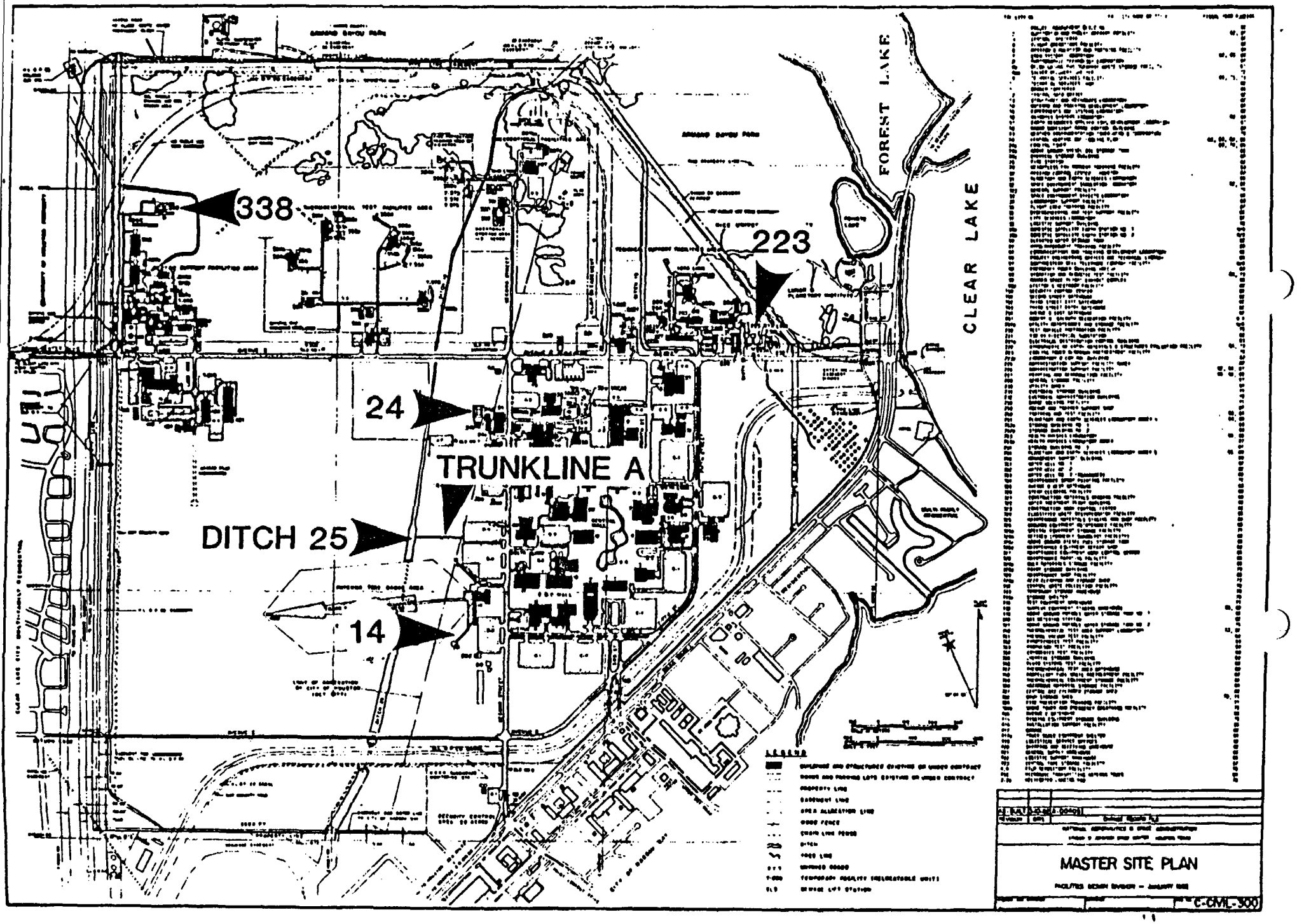
II SPECIFIC WASTE MANAGEMENT UNITS

A. Surface Impoundments and Drainage Ditch

Five surface impoundments were identified during the PA activities (see Plate 1); however, it was documented that one of the surface impoundments had been used exclusively for cooling water, to which only copper sulfate was added. This impoundment is not included in this report because it is not considered a solid waste management unit, and it has not been closed. The remaining four impoundments include:

1. Building 24 Cooling Tower Blowdown - This unit was included in the previously submitted RCRA Part B permit application. During the PA, several activities associated with this impoundment were noted. In September 1979, a geotechnical consulting company, McBride-Ratcliff and Associates, Inc., prepared a report on the construction of the impoundment and the liner (see Attachment 2). The conclusion of this report included an opinion that "the existing liner may be considered to be in compliance with the Texas Department of Water Resources [TDWR] minimum requirements."

Sludge from this impoundment has been removed at least twice using vacuum truck equipment. The sludge was transferred to the drying beds at Building 223, and was transported from there to an off-site commercial disposal facility.



Surface Impoundments

PLATE 1

Three primary spills have occurred in association with the chromate effluent waste at this operation. These occurred on May 20 and June 9, 1977 and March 22, 1978. The spills and response activities were documented in incident reports. In each of these incidents, the spilled liquids pathway was noted to include Trunkline A and Ditch 25 (see Plate 1).

2. Ditch 25, Southwest of Building 14 - In June 1977, there was a fish kill in this ditch. Laboratory analysis indicated that this was caused by cyanide poisoning. The source of the contamination was never identified, and the cyanide level was monitored at frequent intervals with no further problems indicated. An environmental evaluation was performed which provided observations that fish were present the following day. Cleanup activities were not warranted since there were no indications that this would recur.

3. Two Impoundments Near Building 338 - These impoundments were closed between 1974 and 1975. These impoundments were not used for hazardous waste activities. One was a water impact pond for space vehicle splash-down testing, and the other was a sand impact facility for earth drop-testing space vehicles. During the PA, it was determined that the majority of fill used to close these surface impoundments was asphalt, concrete, reinforcement bars, and other

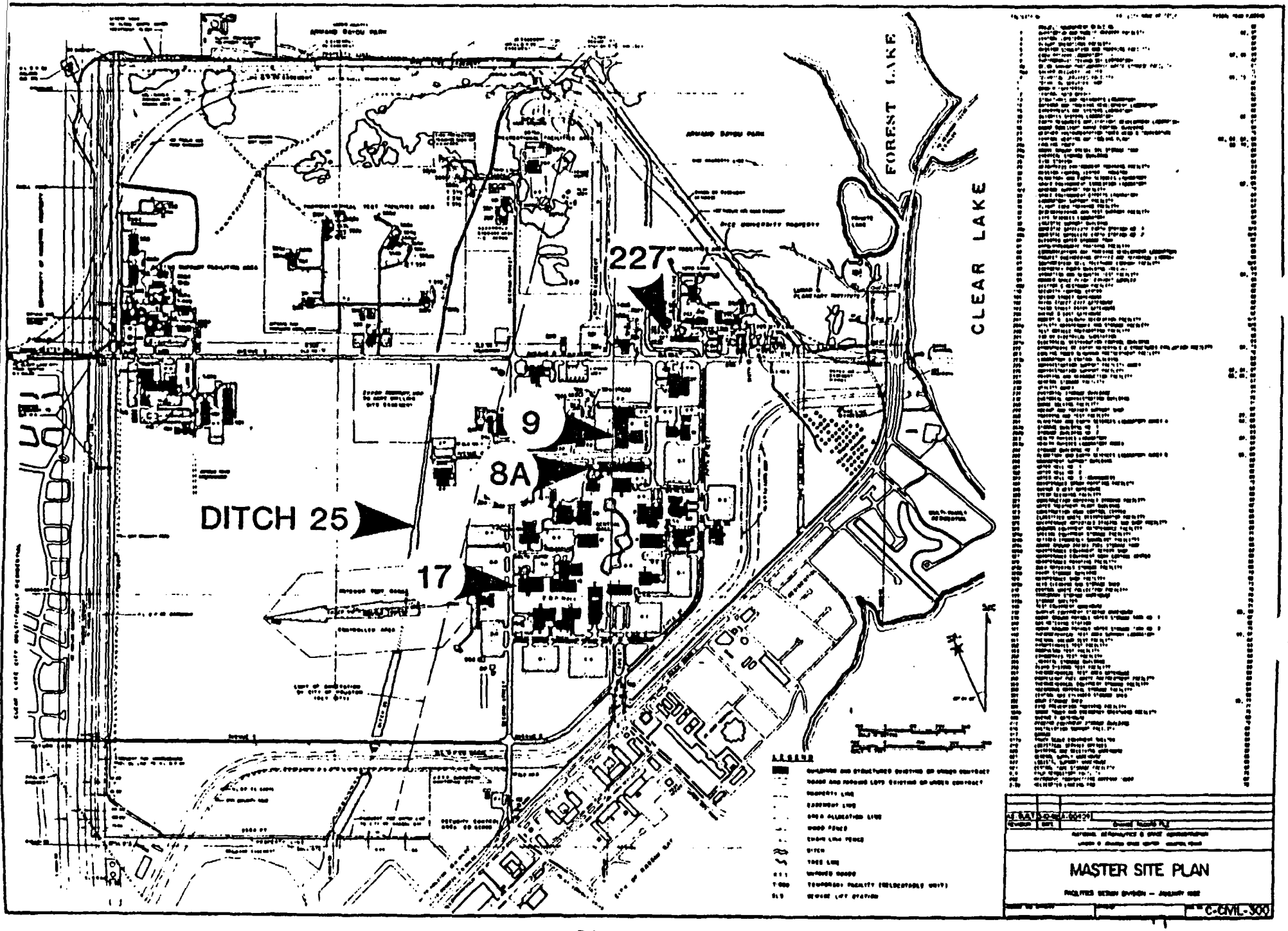
miscellaneous construction type waste. The possibility that municipal type solid waste was placed into these surface impoundments was not substantiated.

B. Tanks

Four primary tank areas used for hazardous waste storage were identified in the PA (see Plate 2). These areas were included in the RCRA Part B permit application with only one exception, as noted below in item 4. A review of files did not provide evidence that there were additional tanks used for hazardous waste in the past at JSC. One of the files reviewed was shipping manifest and transfer tickets dating to 1972, which indicate pickup locations. The other files included tank volume determinations and waste generation files, some of which dated in the late 1960 time period.

Beginning in early 1980, the below-grade tanks were gauged on a routine basis. A review of the available gauging information revealed that these data are not sufficiently reliable to be used to determine whether tank leakage into the soils has occurred.

The JSC revised Part B permit application identifies groundwater monitoring wells to be installed in the vicinity of these tanks. Such wells will permit monitoring of pollutants that could have migrated from the tanks, if any significant releases have occurred.



Tanks

PLATE 2

1. Building 8A Photoprocessing - There are four underground tanks located in this area; three are used for hazardous waste and have a total volume capacity of approximately 29,600 gallons. Tne fourth tank is utilized for silver nitrate recovery, and all wastes from this operation are transferred to one of the other tanks. Three spills were identified from the hazadous waste tanks, which occurred on March 18, March 24, and April 3, 1980. A separate incident report was filed for each spill. The maximum volume of spilled liquid was estimated to be between 50 and 100 gallons per incident. The spills were caused by overtopping of a photowaste tank. Potentially contaminated soils adjacent to these tanks were removed. A site investigation was made, which indicated that no apparent ecological problems were detected. The problem of overtopping was corrected by establishing a procedure which requires removal of waste when the tanks are at 50 percent capacity.

2. Building 9 Plating Shop - There are three underground tanks and one aboveground tank in this area. The underground tanks have a total capacity of approximately 6,500 gallons, and the aboveground tank has a capacity of approximately 10,000 gallons. No problems were identified in association with these tanks during the PA.

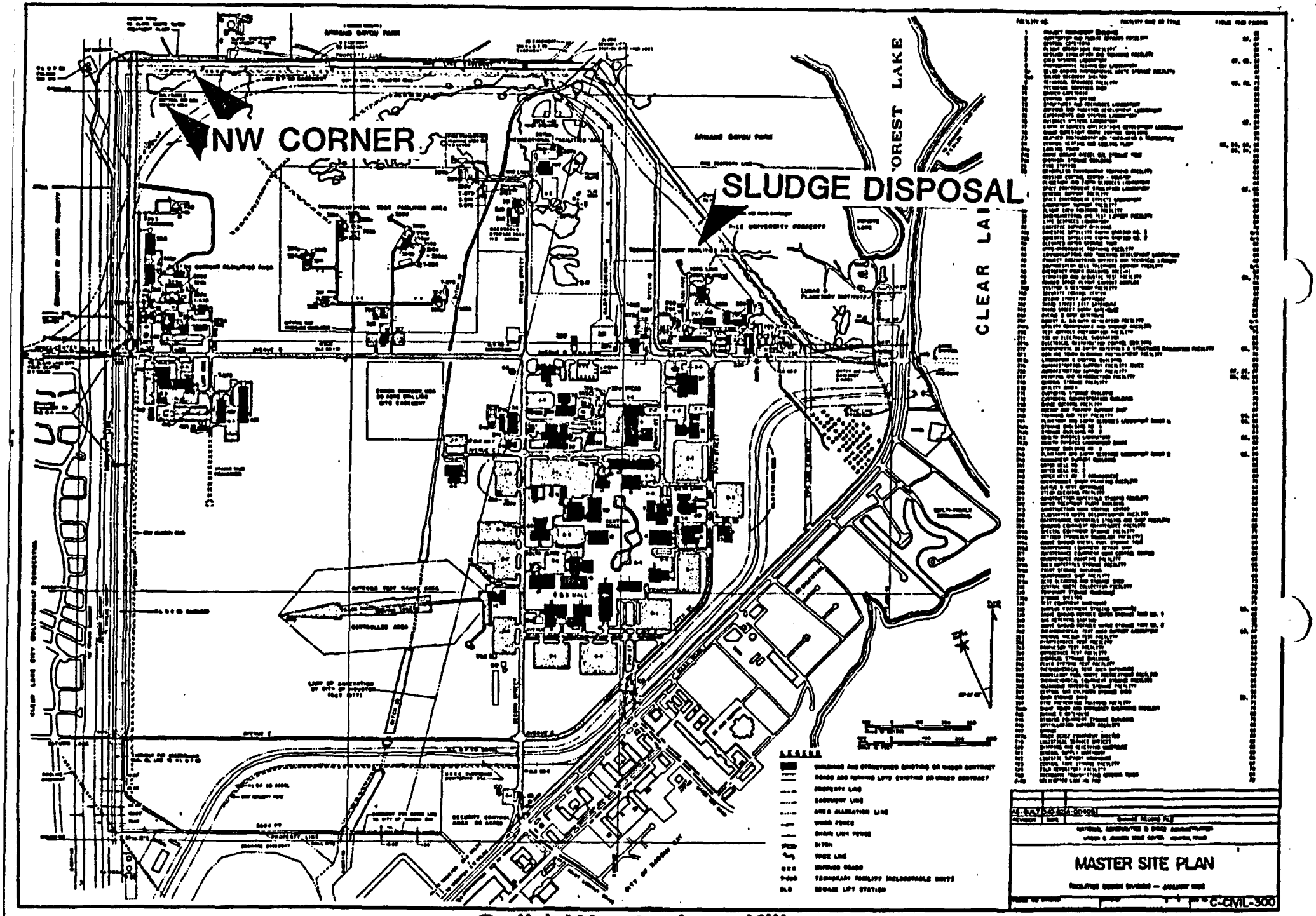
3. Building 17 Photoprocessing - There are two underground tanks in this area, having a total capacity of approximately 1,050 gallons. No problems were identified in association with these tanks during the PA.

4. Building 227 Photoprocessing - There are two tanks located in this area, only one of which was included in the Part B permit application. Early JSC records indicate that both tanks may have been utilized for chemical waste storage; however, by the time the Part B permit application was submitted, one of the tanks had been converted to storage of domestic waste and is no longer used for potentially hazardous waste.

C. Solid Waste Landfills

Two surface impoundments closed by landfilling were discussed previously under Section A. In addition to these, at least one other was identified during the PA (see Plate 3). For a period of approximately four years (1972 to 1976), dried processed sewage sludge from the secondary treatment plant was removed from the JSC sewage treatment plant (Building 223) and spread on a land area north of Building 223. The purpose of this land application of dried sludges was to fill in a depressed area of about three acres in size.

1. Northwest Corner of JSC Facility - During the early construction period through the mid-1970's, an area in the northwest corner of the JSC facility was designated as a landfill for construction debris. This area covers several surface acres, under which an undetermined volume of solid waste was placed. There are no written records concerning the specific categories of waste placed into this area. Waste management records for hazardous materials were reviewed



Solid Waste Landfills

PLATE 3

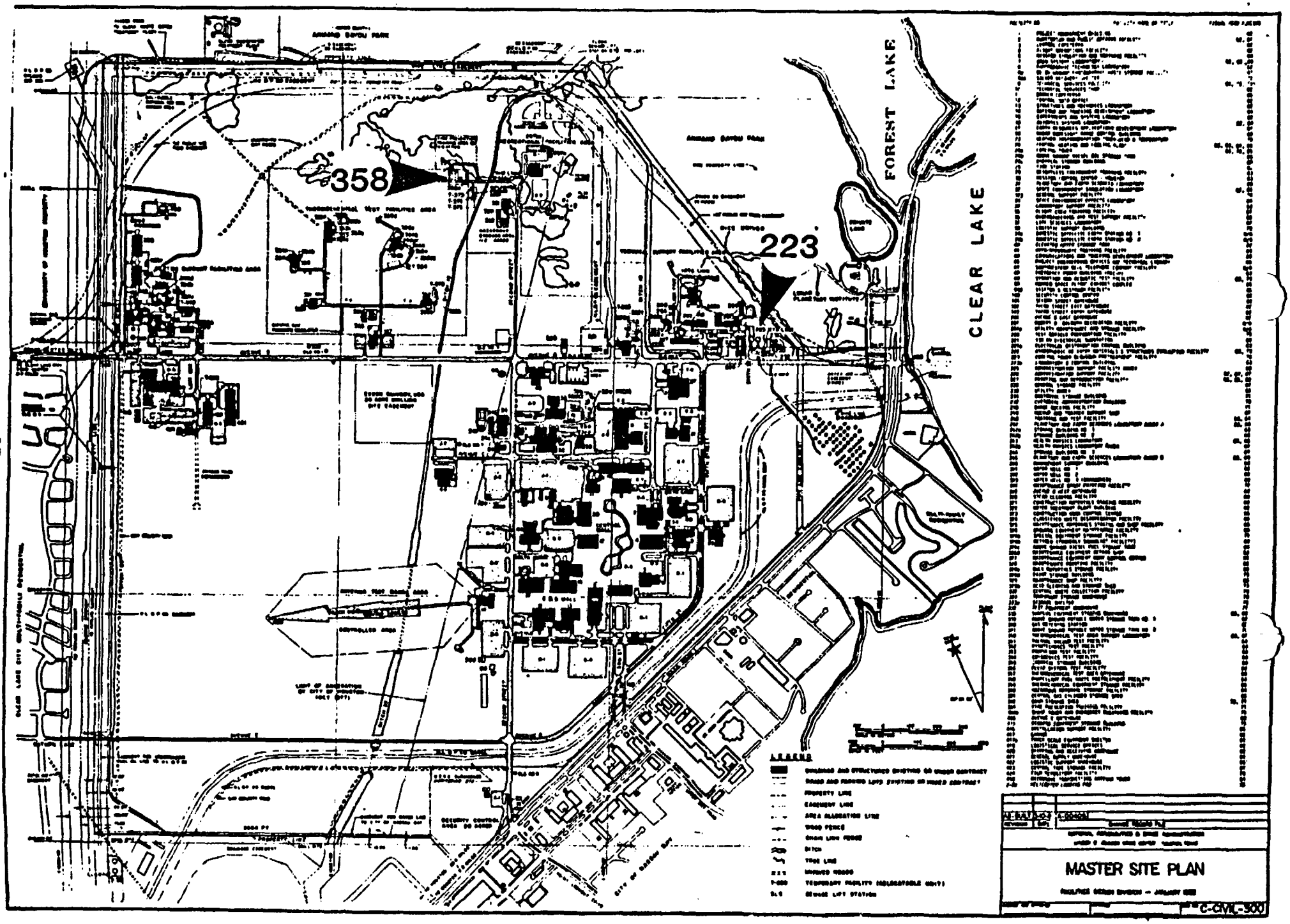
to look for indications that hazardous wastes were placed into the area. This review provided no such indication, but did provide information showing that hazardous wastes were shipped to off-site commercial facilities during an overlapping period when this landfill was being used. It is possible that asbestos waste may have been placed into the area, since asbestos insulation was used and disposed of during the 1960 and 1970 time periods.

D. Container Storage Areas

During the PA, container storage areas were divided into two categories: 1) product chemical storage; and 2) chemical waste storage (see Plate 4). Approximately 20 areas were identified which were included in the first category. The PA review identified several small spills in these areas, most of which were of less than five gallons and were cleaned up. None of the identified spills in these areas was determined to be significant, except for those mentioned in Section III of this report.

1. Building 358 Container Storage Area - This unit was included in the RCRA Part B permit application.

2. Building 223 - Prior to the utilization of Building 358 for waste storage, hazardous wastes were transferred to and stored at Building 223. The building has two rooms, only one of which was used for storage. By 1978, this area was no longer used for storage, or storage volumes were minimal.



Container Storage Areas

PLATE 4

E. Treatment Units

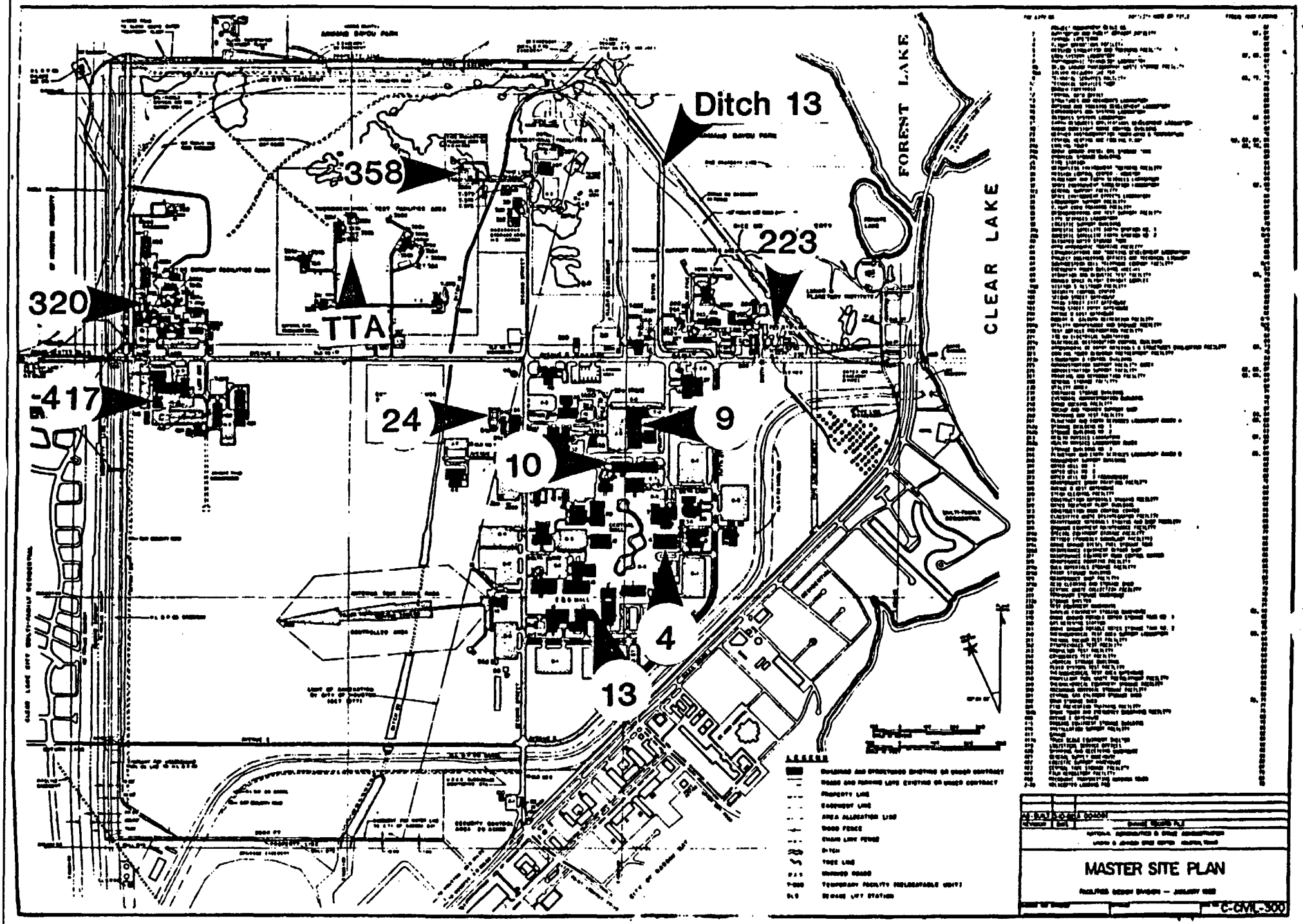
The PA evaluation identified several treatment units which were process oriented or associated with wastewater treatment (see Plate 5). The files also indicated a few additional treatment systems that have been used on a research/experimental basis for short periods. These experimental systems were used and closed during the 1960's and 1970's, and did not appear to have a substantial environmental impact because of the transient nature and small quantities of materials handled. Those types of facilities are not included in these discussions, unless they handled waste materials and continued operating for a period exceeding six months.

1. Building 223 Blowdown Treatment Plant - From 1962 to 1973, JSC Building 223 served as the treatment plant for all JSC biodegradable, domestic wastewater. With the issuance of Texas Water Quality Board orders for the control of sewage effluents to Clear Lake, JSC began the evaluation of diverting its domestic wastewater to an offsite, regional treatment plant operated by Clear Lake City Water Authority (CLCWA). This diversion of domestic wastewater to the offsite publicly owned treatment works (POTW) was accomplished in 1973. At that time, the treatment of wastewater at 223 was ceased. JSC's influent to the CLCWA POTW is checked for pH and 10 metal parameters on a regular basis.

The need for a permanent pretreatment unit for blowdown water from the JSC central heating and cooling plant was established in 1973, and plans were initiated to convert the Building 223 facilities to this use. Building 223 has been dedicated to the use of pretreatment since 1976, except for the period of upgrading the unit.

Sludge drying beds at the unit have, periodically, also been used for dewatering sludges taken from the alternate blowdown treatment pond (impoundment) at Building 24. The closure of the Building 24 impoundment is committed by JSC, at which time Building 223 will be utilized as the permanent blowdown pretreatment unit. This unit is connected to the impoundment at Building 24 via an underground pipeline. When the alternate blowdown pretreatment at Building 24 was operated, the sludge drying beds at Building 223 were occasionally used to dry sludge from the Building 24 unit. The drying beds produced a dry sludge waste with varying levels of chromium. Waste shipping records as early as 1973 indicated that chromate sludge was shipped from this unit's drying beds to an off-site commercial disposal company.

2. Treatment Tank Building 358 - This tank is a concrete-lined, below-ground unit which receives and treats effluent from the thermochemical test area (TTA). At present, the only known contaminant from the TTA is monomethyl hydrazine; however, this unit has received nitrogen tetraoxide and some very small quantities of



Treatment Units

PLATE 5

water-reactive liquids from lithium-bromide batteries on very infrequent periods, as recently as 1982. During the preparation of the Part B permit application, the TDH determined that this unit is exempt from RCRA status because it is a treatment tank and its effluent is transferred to the CLCWA POTW. The existing policy for this tank is that the liquids are tested for hydrazine. If hydrazine is indicated, the liquids are treated with chlorine, after which they are tested again. If the hydrazine content is less than 1 milligram per liter (mg/l), the liquid is transferred to the CLCWA POTW. If hydrazine is greater than 1 mg/l, it is either treated again or shipped off site to an approved hazardous waste disposal facility.

3. Oil Water Separators - There are two oil water separators at JSC in Buildings 320 and 417. These units appear to have little or no potentially adverse impact to the environment.

4. Acid Neutralization Tanks - There have been four acid neutralization tanks utilized at JSC. These units have been abandoned in place and are no longer used. They are located at the southside of Building 4, Building 9, Building 10, and Building 13. All tanks were reportedly installed to provide a means of neutralizing small-quantity acid spills into drains within these buildings. Any hazardous wastes currently qenerated in these buildings are containerized and transferred to the centralized storage area, Building 358.

a. Building 4 Tank - Tied to sanitary sewer; reportedly taken out of service in the 1970's.

b. Building 9 Tank - Tied to storm sewer; reportedly taken out of service in 1973.

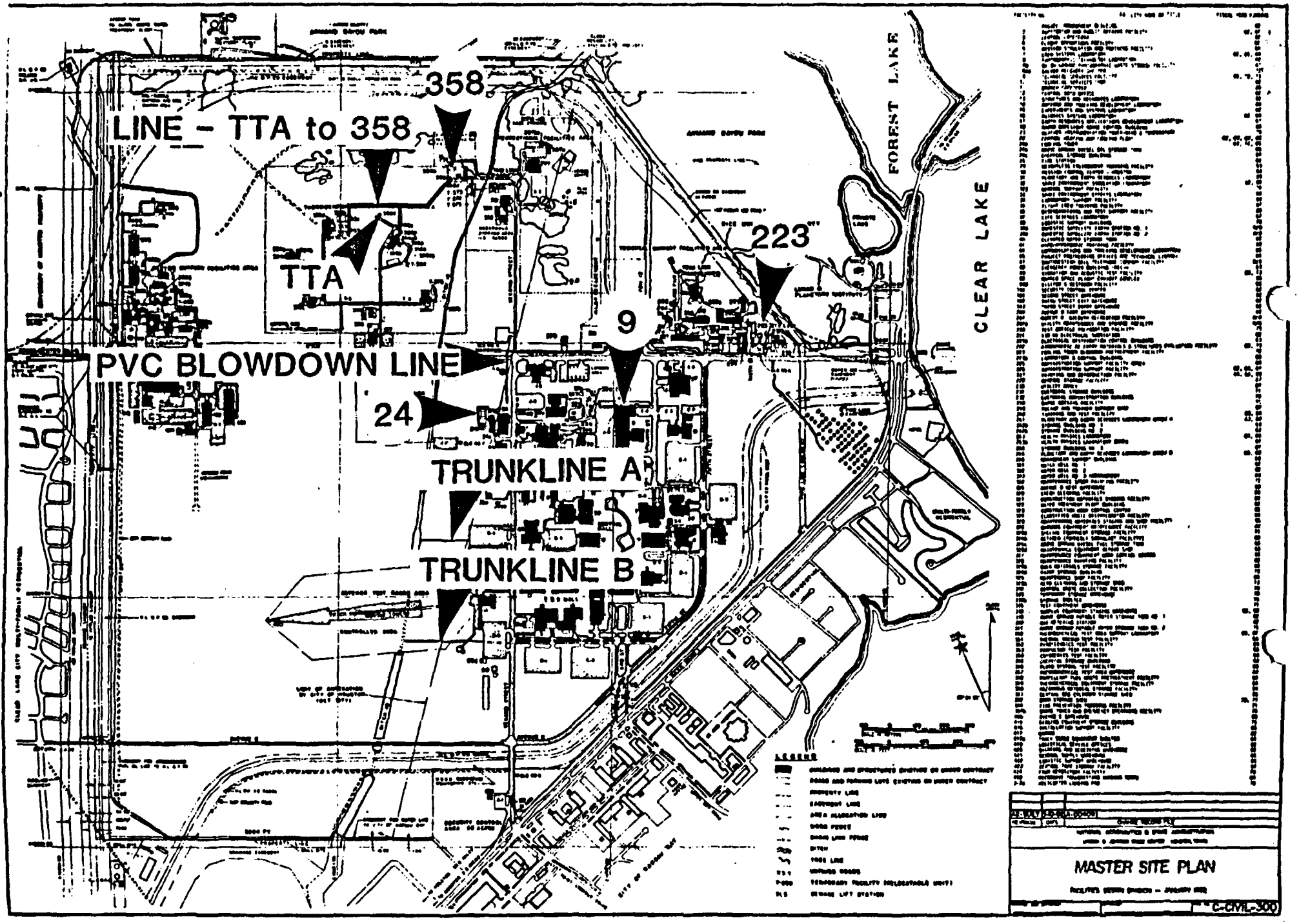
c. Building 10 Tank - Tied to storm sewer; reportedly taken out of service in 1975.

d. Building 13 Tank - Tied to sanitary sewer; reportedly taken out of service in the 1970's.

F. Underground lines

During the PA, three underground lines were identified which have been used for the transfer of hazardous waste (see Plate 6). These lines are discussed below. Records pertaining to lines which transfer waste from process areas to the previously discussed tanks were evaluated; however, during the review of these records there were no indications of problems, and further discussions are not warranted. Additionally, two underground storm drainage lines (Trunklines A and B) have had contaminants pass through them at various times due to spills.

1. Building 24 to Building 223 - This line is a 4-inch PVC pipe which was used to transfer cooling tower blowdown effluents from Building 24 to the treatment unit at Building 223. In 1976, prior to



Underground Lines

PLATE 6

utilizing the line for waste transfer, it was pressure tested and found to have a number of leaks. Further evaluations were made and it was determined that the leaks were located at joint couplings. Because of soil expansion and shrinkage, the PVC couplings were removed and replaced with stainless steel couplings, which would allow more movement of the pipe without damaging the integrity of the couplings. Testing of modified pipeline showed no measurable leaking or significant pressure drop at a controlled pressure of 20 psi gauge, or less. Upon closure of the impoundment at Building 24, this line will be utilized to transfer blowdown water at a controlled pressure of 15 pounds per square inch, or less.

2. TTA to Tank at Building 358 - This line is used to transfer water contaminated with hydrazine from the TTA to the tank at Building 358. There were no records found during the PA which indicated problems with this line.

3. Building 9 - Alkaline Battery Shop - This operation currently consists of activating small alkaline batteries with a potassium hydroxide electrolyte. No concentrated wastes are generated, but dilute electrolyte solutions are discharged to a receptor sump. The receptor sump discharged to a pipeline which was designed to transfer the liquids into Ditch 13. In May 1975, it was discovered that this line was not connected and dead-ended a few feet from the building.

This line was subsequently repaired. Spent solution waste containers are used to collect waste electrolyte. These containers are picked up on a periodic basis and transferred to Building 358.

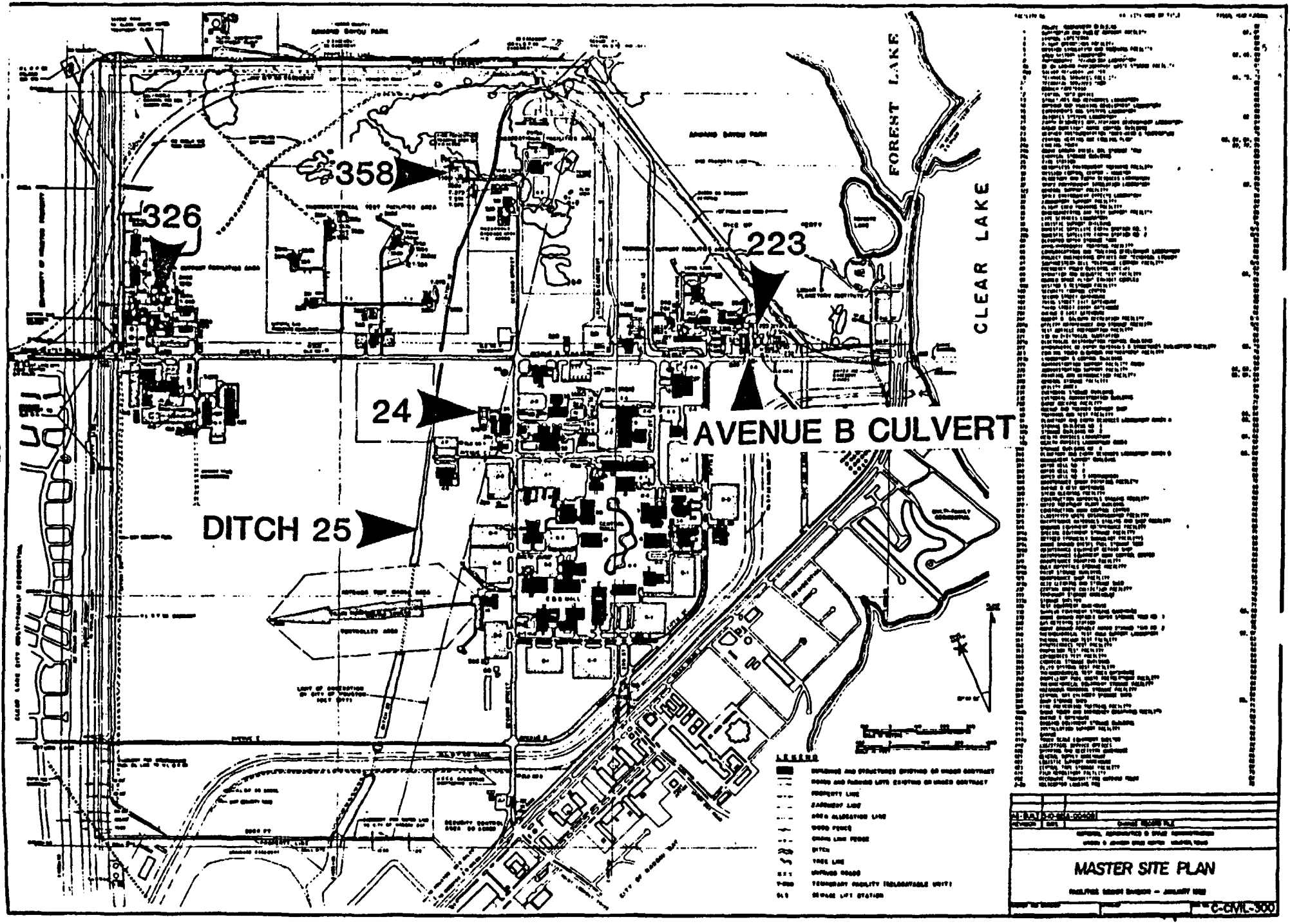
4. Building 9 - Lead Acid Battery Shop - This operation was established in the west side of Building 9 in 1979. Spent sulfuric acid electrolyte was discharged to the Plating Shop waste tanks beneath the shop. In 1980, the procedures were modified so that the electrolyte from only leaking batteries is now disposed of into the Plating Shop acid waste tanks.

III SPILLS

The criteria used to determine which spills were applicable for this report were discussed in Section I, Introduction. The interpretation made was that any spill greater than five gallons which occurred since November 19, 1980, and that was not cleaned up, will be reported. Those spills which are discussed in Section II of this report are not included in these discussions. Approximate locations of the following spills can be found on Plate 7. Documentation was found for each of the following spills which indicated that the areas were closely monitored, spilled materials were neutralized and, when warranted, soils were removed.

A. Building 358 - The tanks used for treating hydrazine overflowed on April 4, 1981. This occurred because of the use of the deluge system in the TTA area. The deluge system was secured and monitoring of the overflow area indicated that there were no significant levels of contamination.

B. Building 326 - On April 24, 1981, a pesticide spill occurred in the laydown area adjacent to this building. The pesticide was Bromacil, and the volume was approximately 35 gallons. The spill was contained and cleaned up using absorbent. The absorbent was utilized for pest control along the fence line.



Spills

PLATE 7

C. Building 223 - A caustic spill occurred on May 27, 1981, because of a leak from Pump No. 5 inside the pumphouse. Approximately 25 gallons spilled onto the floor, but escaped outside the building on the south side through a crack in the foundation. The caustic was diluted with water being used to wash it to the Avenue B culvert.

D. Building 358 - On October 2, 1981, a caustic spill occurred in the laydown yard. The volume of the spilled material was approximately 50 gallons. The area was flushed with water which discharged to the adjacent ditch.

E. Building 24 - A sulfuric acid raw material spill occurred at JSC in 1984. A storage tank for new sulfuric acid behind Building 24 experienced a leak. The acid material ran into a nearby surface drainage ditch that is connected to Ditch No. 25. Once discovered, the sulfuric acid material was retained in the small ditch alongside Building No. 24 by sand-bagging. Both sodium carbonate and sodium bicarbonate were used for neutralization of the spilled sulfuric acid. A total of 54 sacks of lime was used to bring the material in the ditch to a pH of 7.6. Once the material was neutralized to this pH, the liquid material was permitted to flow into Ditch No. 25. Contaminated soils in the small ditch were subsequently removed. A total of between 20,000 and 40,000 gallons of water was used in the neutralization process.

IV SUMMARY

A review of available files and personal interviews with selected JSC personnel were accomplished to comply with a TDH requirement for a report identifying solid waste management units, and any releases of hazardous waste or constituents that may have occurred.

The identification of hazardous waste management units was accomplished earlier in the JSC submittal to TDH of the revised Part B permit application on February 14, 1985.

This report details the results of a Preliminary Assessment and Site Investigation. Specific observations were made of waste management units and spill areas to identify adverse effects resulting from the waste management unit's operations or from a spill. No significant adverse impacts were noted.

This report provides data on specific waste management units such as surface impoundments, drainage ditches, tanks, solid waste landfills, container storage areas, treatment units, underground lines, and a review of applicable spills.

The JSC files were found to be sufficiently complete to allow an evaluation of JSC waste management practices with respect to waste management unit operations, spills, and the subsequent recovery and

cleanup activities. The JSC files are not, however, sufficiently detailed to determine whether leakage may have occurred from a surface impoundment or the underground waste storage tanks.

Documented JSC response to incidents outlined in this report were found to have been in conformance with generally accepted practices of the industry at the time of an incident. Waste management activities were found to have equaled or exceeded applicable regulatory requirements and standard industry practices.

Appendix A

Texas Department of Health

Robert Bernstein, M.D., F.A.C.P.
Commissioner

1100 West 49th Street
Austin, Texas 78756
(512) 458-7111

Robert A. MacLean, M.D.
Deputy Commissioner
Professional Services

Hermas L. Miller
Deputy Commissioner
Management and Administration

FEB 15 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. K. B. Gilbreath
Director, Center Operations
National Aeronautics & Space Administration
Lyndon B. Johnson Space Center
Houston, Texas 77058

ATTN: JN/Mr. Glenn Spencer, P.E.

Subject: Hazardous Solid Waste - Harris County
NASA - Permit Application No. 71022
Additional Permitting Requirements as a Result of RCRA Reauthorization

Dear Mr. Gilbreath:

The Hazardous and Solid Waste Amendments of 1984 (HSWA) to the Resource Conservation and Recovery Act (RCRA) which were enacted during the RCRA Reauthorization require higher standards and certain other actions for hazardous waste treatment, storage and disposal facilities than are currently required by this Department's "Municipal Solid Waste Management Regulations." In order to ensure that the new requirements are implemented as early as possible (some have an effective date as of the date of enactment - November 8, 1984), the HSWA have given the Administrator of the EPA the authority in a State such as Texas which had previously been authorized to conduct a hazardous waste program to issue or deny permits or those portions of permits affected by the requirements and prohibitions established by the HSWA. This authority applies until such time as the State program is amended by appropriate legislation or rule changes to reflect the amendments made by the HSWA and such program amendments receive interim or final authorization by the EPA.

The HSWA contain immediate requirements in Section 3004(u) and (v) (copy enclosed) for facility owners or operators to determine if any releases have occurred of hazardous wastes or constituents from any solid waste management unit, regardless of when the waste was placed in the unit and whether the unit is active or inactive, and develop plans with schedules of compliance for corrective action. If the corrective action is not completed before permit issuance, a compliance schedule will be included in the permit. As a permit condition, the owner or operator must provide assurance of financial responsibility for completing such corrective action (this does not apply to Federal or State-owned facilities).

As a means of determining the need for further actions needed to comply with the requirements of Section 3004(u) and (v), it is requested that within 45 days of receipt of this letter you submit a report to this office identifying all solid waste management units within your facility and any releases of hazardous wastes or constituents that may have occurred or are occurring and whether any such releases may have migrated offsite. This initial report shall be based on a review of your files (operational, inspection, complaint, monitoring and sampling reports) for each hazardous and nonhazardous active and inactive solid waste management unit (landfill, surface impoundment, waste pile, land treatment unit, tank, container storage unit, incinerator, injection well, wastewater treatment unit, elementary neutralization unit, transfer station, or resource recovery facility). Releases to be reported include waste leaks or leachate plumes into the soil or groundwater and any spills from any unit. Under current Federal regulations, any spill of hazardous waste which occurred after November 1980 and not cleaned up is by definition a disposal unit.

Other requirements which require action from permit applicants or permittees within the near future are: (1) within nine months of enactment (by August 8, 1985) permit applications for landfills and surface impoundments must be accompanied by an assessment of the potential for the public to be exposed to hazardous substances released from these units; (2) after September 1, 1985, as a condition for an on-site permit, a generator must certify at least annually on his efforts to reduce waste volume and the reduction actually achieved; and (3) by November 8, 1985, an owner or operator of a land disposal facility must certify that such facility is in compliance with all applicable groundwater monitoring and financial responsibilities or that facility's interim status shall terminate. Also, no later than March 1, 1985, EPA will promulgate final permitting standards for underground tanks that cannot be entered for inspection and may affect some applications currently in processing. You are urged to initiate action as necessary to accomplish the necessary reports prior to the established deadlines.

Also enclosed are two draft documents developed by the EPA highlighting the impacts of the RCRA Reauthorization on the permit program.

If there are any questions, please do not hesitate to call me.

Sincerely yours,

Hector H. Mendieta

Hector H. Mendieta, P.E.
Director, Permits Division
Bureau of Solid Waste Management

HHM:be
Enclosures

Appendix B

McBride-Ratcliff
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September 24, 1979

Bible Engineering Corporation
2640 Fountainview Suite 332
Houston, Texas 77057

ATTENTION: Mr. Wayne Mather

SUBJECT: Letter Report
Blowdown Water Pretreatment Pond
NASA
MRA File: 79-215

Gentlemen:

We have completed our geotechnical investigation for the above referenced project and herein submit our report. This work was authorized by Mr. Wayne Mather of Bible Engineering Corporation.

Our investigation included the drilling of six test borings with hand equipment at the site, the performance of soil mechanics laboratory tests to determine the physical and engineering properties of the subsoils, and engineering analyses to evaluate the adequacy of the existing lining in the blowdown pond.

Four borings were located on the side slopes of the pond, at approximately the elevation of the normal pond level. Two borings were taken in the bottom of the pond. The approximate locations are shown in Figure 1. All borings extended three feet into the existing lining. Two undisturbed samples and one disturbed sample were taken from each of the borings on the slopes, and one disturbed sample was taken from each of the borings in the pond bottom. Atterberg limits determinations were made on 12 of the samples, and constant-head permeability tests were conducted on three of the undisturbed samples.

The liner appears to be constructed of clays and sandy clays, with a thickness of at least 36 inches over most of the pond. How-

ever, the borings in the southern and western slopes encountered a clayey sand below 24 inches of lining material. The clay and sandy clay liner exhibited a range in plasticity indices of 10 to 36 percent. Permeabilities ranged from 4×10^{-8} cm/sec to less than 5×10^{-9} cm/sec. The results of all laboratory tests are shown on the boring logs and in Table 1.

The liner may be considered to consist of two areas: 1) north and east slopes and bottom, and 2) south and west slopes. Area No. 1 consists of at least 36 inches of liner, material exhibiting a permeability of 4×10^{-8} cm/sec or less. Area No. 2 consists of at least 24 inches of liner material exhibiting the same permeability. For facilities such as blowdown ponds, the Texas Department of Water Resources requires at least 36 inches of liner material exhibiting a permeability of 1×10^{-7} cm/sec or less. An equivlant liner may be used if shown to equal or exceed the performance of the liner described above.

Area No. 1 exceeds the Texas Department of Water Resources standards in both thickness of the liner material and permeability. Area No. 2 satisfies requirements in terms of equivalent expected performance, as shown in the seepage computations below.

According to Darcy's Law:

$$Q = k \cdot i \cdot A$$

where Q= Seepage quantity
k= cofficient of permeability
i= hydraulic gradient
A= cross-sectional area

For conditions when the pond contains six feet of water, and 3:1 side slopes:

h(ft)	t(in)	k(cm/sec)	i=h/t	A(ft^2/ft)	Q gpd/ft
3	24	4×10^{-8}	19	1.5	0.0242
3	36	1×10^{-7}	19	1.0	0.0404

where h= average head of water acting on the slope
t= thickness of the lining

The seepage through the present liner in Area No. 2 is only 60 percent of the seepage through the liner conforming to the Texas Department of Water Resources minimum requirements. The analyses were conducted in a conservative manner and represents an expected upper bound behavior. Thus, the existing liner may be considered to be in compliance with the Texas Department of Water Resources minimum requirements.

Reasonable variations in the subsurface soil conditions from those reported are assumed. If unusual conditions are encountered during construction we should be notified immediately.

We appreciate the opportunity to participate in this project. If you have any questions or if we may be of further assistance during the design or construction of this project, please do not hesitate to contact us.

Yours very truly,

McBRIDE-RATCLIFF AND ASSOCIATES, INC.

Jonathan J. Grosch

Jonathan J. Grosch

Charles E. Williams

Charles E. Williams, P.E.

JJG/CEW/sd

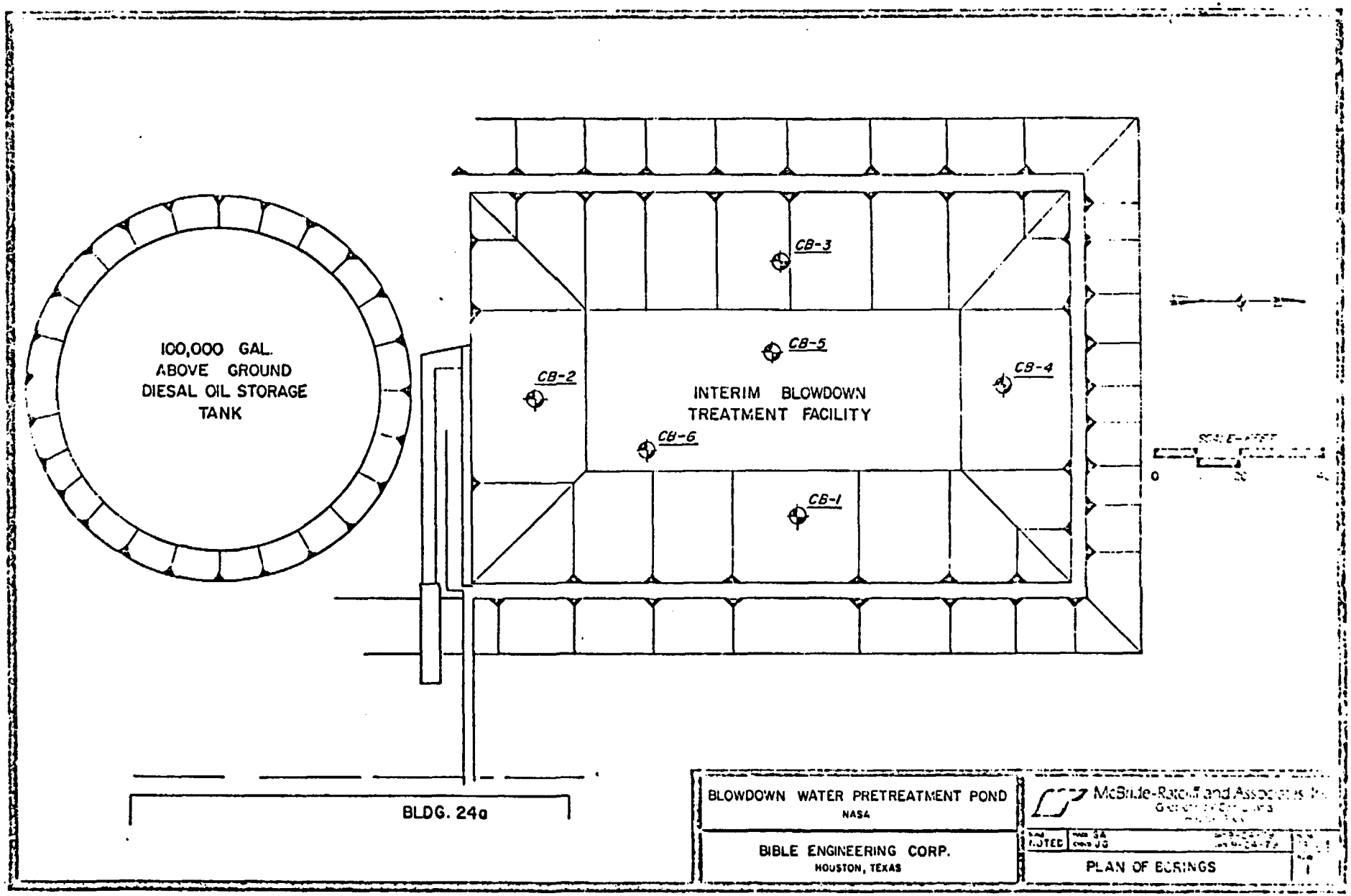
100,000 GAL.
ABOVE GROUND
DIESAL OIL STORAGE
TANK
CB-3
CB-5
CB-2
CB-4
INTERIM BLOWDOWN
TREATMENT FACILITY
CB-6
CB-1
BLDG. 24a
BLOWDOWN WATER PRETREATMENT POND
NASA
BIBLE ENGINEERING CORP.
HOUSTON, TEXAS
McBride-Ratcliff and Associates Inc.
PLAN OF BORINGS

TABLE I

Location	Boring	Depth (ft.)	LL	PL	PL ?	Permeability (cm/sec)
East Slope	CB-1	½-1	27	16	11	
		2½-3	36	16	20	$<5x10^{-9}$
South Slope	CB-2	½-1	50	20	33	
		1½-2	58	22	36	
		2½-3	18	16	2	
West Slope	CB-3	½-1	26	16	10	$4x10^{-8}$
		1½-2	34	17	17	
		2½-3	19	17	2	
North Slope	CB-4	½-1	38	16	22	
		2½-3	34	15	19	$3x10^{-8}$
Bottom	CB-5	2½-3	36	16	20	
Bottom	CB-6	2½-3	50	20	34	

Table 1. Summary of Laboratory Results

LOG OF BORING

PROJECT: Blowdown Water Pretreatment Pond
NASA

CLIENT: Bible Engineering Corporation
Houston, Texas

BORING NO. CB-1
FILE NO. 79-215
DATE 9/5/79

DRY AUGERED 0 TO 3 FEET
WASH BORED TO FEET

FREE WATER ENCOUNTERED YES NO

AT FT. DEPTH.

WATER AT FT. AFTER

SOIL SYMBOL	DEPTH (feet)	SAMPLES	Penetration Resistance (N) or TSF	Moisture Content %	Dry Density, PCF	Compressive Strength TSF	Failure Strain - %	ATTERBERG LIMITS Liquid LL	Plastic PL	Plasticity Index PI	DESCRIPTION OF STRATUM
	1							27	16	11	Medium tan & dark gray SANDY CLAY (CL)
	2										stiff, tan & light gray @ 2'
	3							36	16	20	k = <5 x 10^{-9} cm/sec
											Bottom @ 3 ft.

PENETRATION RESISTANCE

* SLICKENSIDED FAILURE
( ) CONFINING PRESSURE, PSI
G.S. GRAIN SIZE

(N) - STANDARD PENETRATION RESISTANCE (SPT)
TSF - POCKET PENETROMETER OR TORVANE ESTIMATED UNCONFINED COMPRESSIVE STRENGTH, TONS PER SQ. FOOT

LOG OF BORING

PROJECT: Blowdown Water Pretreatment Pond
NASA

BORING NO. CB-2
FILE NO. 79-215
DATE 9/5/79

CLIENT: Bible Engineering Corporation
Houston, Texas

DRY AUGERED 0 TO 3 FEET
WASH BORED TO FEET

FREE WATER ENCOUNTERED YES NO

AT FT. DEPTH.

WATER AT FT. AFTER

SOIL SYMBOL	DEPTH (feet)	SAMPLES	Penetration Resistance (N) or TSF	Moisture Content %	Dry Density, PCF	Compressive Strength TSF	Failure Strain - %	ATTERBERG LIMITS Liquid LL	Plastic PL	Plasticity Index PI	DESCRIPTION OF STRATUM
								53	20	33	Soft dark gray CLAY (CH), slightly sandy
	1										
								58	22	36	
	2										
								18	16	2	Firm tan & gray CLAYEY SAND (SC)
	3										Bottom @ 3 ft.

* SLICKENSIDED FAILURE
( ) CONFINING PRESSURE, PSI
G.S. GRAIN SIZE

PENETRATION RESISTANCE
(N) - STANDARD PENETRATION RESISTANCE (SPT)
TSF - POCKET PENETROMETER OR TORVANE ESTIMATED UNCONFINED COMPRESSIVE STRENGTH, TONS PER SQ. FOOT

LOG OF BORING

PROJECT: Blowdown Water Pretreatment Pond
NASA

CLIENT: Bible Engineering Corporation
Houston, Texas

BORING NO. CB-3
FILE NO. 79-215
DATE 9/5/79

DRY AUGERED 0 TO 3 FEET
WASH BORED TO FEET

FREE WATER ENCOUNTERED YES NO

AT FT. DEPTH.

WATER AT FT. AFTER

SOIL SYMBOL	DEPTH (feet)	SAMPLES	Penetration Resistance (N) or TSF	Moisture Content %	Dry Density, PCF	Compressive Strength TSF	Failure Strain - %	ATTERBERG LIMITS Liquid LL	Plastic PL	Plasticity Index PI	DESCRIPTION OF STRATUM
	1							26	16	10	Soft medium dark gray SANDY CLAY (CL) $k = 4 \times 10^{-8}$ cm/sec
	2							34	17	17	
	3							19	17	2	Firm tan & gray CLAYEY SAND (SC)
											Bottom @ 3 ft.

• SLICKENSIDED FAILURE
( ) CONFINING PRESSURE, PSI
G.S. GRAIN SIZE

PENETRATION RESISTANCE
(N) - STANDARD PENETRATION RESISTANCE (SPT)
TSF - POCKET PENETROMETER OR TORVANE ESTIMATED UNCONFINED COMPRESSIVE STRENGTH, TONS PER SQ. FOOT

McBride-Ratcliff and Associates, Inc.

LOG OF BORING

PROJECT: Blowdown Water Pretreatment Pond
NASA

CLIENT: Bible Engineering Corporation
Houston, Texas

BORING NO. CB-4
FILE NO. 79-215
DATE 9/5/79

DRY AUGERED 0 TO 3 FEET
WASH BORED TO FEET

FREE WATER ENCOUNTERED YES NO

AT FT. DEPTH.

WATER AT FT. AFTER

SOIL SYMBOL	DEPTH (feet)	SAMPLES	Penetration Resistance (N) or TSF	Moisture Content %	Dry Density, PCF	Compressive Strength TSF	Failure Strain - %	ATTERBERG LIMITS Liquid LL	Plastic PL	Plasticity Index PI	DESCRIPTION OF STRATUM
											Soft dark gray SANDY CLAY (CL)
	1							38	16	22	
	2										medium, tan & gray @ 2'
	3							34	15	19	k = 3 x 10^{-8} cm/sec
											Bottom @ 3 ft.

• SLICKENSIDED FAILURE
( ) CONFINING PRESSURE, PSI
G.S. GRAIN SIZE

PENETRATION RESISTANCE
(N) - STANDARD PENETRATION RESISTANCE (SPT)
TSF - POCKET PENETROMETER OR TORVANE ESTIMATED UNCONFINED COMPRESSIVE STRENGTH, TONS PER SQ. FOOT

LOG OF BORING

PROJECT: Blowdown Water Pretreatment Pond
NASA

BORING NO. CB-4
FILE NO. 79-215
DATE 9/5/79

CLIENT: Bible Engineering Corporation
Houston, Texas

FIELD DATA					LABORATORY DATA					
SOIL SYMBOL	DEPTH (feet)	SAMPLES	Penetration Resistance (N) or TSF	Moisture Content %	Dry Density, PCF	Compressive Strength TSF	Failure Strain - %	ATTERBERG LIMITS Liquid LL	Plastic PL	Plasticity Index PI
	0									
	1							38	16	22
	2									
	3							34	15	19

DRY AUGERED 0 TO 3 FEET
WASH BORED TO FEET

FREE WATER ENCOUNTERED YES NO

AT FT. DEPTH.

WATER AT FT. AFTER

DESCRIPTION OF STRATUM

Soft dark gray SANDY CLAY (CL)

medium, tan & gray @ 2'

$k = 3 \times 10^{-8}$ cm/sec

Bottom @ 3 ft.

PENETRATION RESISTANCE

• SLICKENSIDED FAILURE
( ) CONFINING PRESSURE, PSI
G.S. GRAIN SIZE

(N) - STANDARD PENETRATION RESISTANCE (SPT)
TSF - POCKET PENETROMETER OR TORVANE ESTIMATED UNCONFINED COMPRESSIVE STRENGTH, TONS PER SQ. FOOT

LOG OF BORING

PROJECT: Blowdown Water Pretreatment Pond
NASA

CLIENT: Bible Engineering Corporation
Houston, Texas

BORING NO. CB-5
FILE NO. 79-215
DATE 9/5/79

DRY AUGERED 0 TO 3 FEET
WASH BORED TO FEET

FREE WATER ENCOUNTERED YES NO

AT FT. DEPTH.

WATER AT FT. AFTER

SOIL SYMBOL	DEPTH (feet)	SAMPLES	Penetration Resistance (N) or TSF	Moisture Content %	Dry Density, PCF	Compressive Strength TSF	Failure Strain - %	ATTERBERG LIMITS Liquid LL	Plastic PL	Plasticity Index PI	DESCRIPTION OF STRATUM
	1										Stiff tan & light gray SANDY CLAY (CL)
	2										
	3							36	16	20	
											Bottom @ 3 ft.

PENETRATION RESISTANCE

* SLICKENSIDED FAILURE
( ) CONFINING PRESSURE, PSI
G.S. GRAIN SIZE

(N) - STANDARD PENETRATION RESISTANCE (SPT)
TSF - POCKET PENETROMETER OR TORVANE ESTIMATED UNCONFINED COMPRESSIVE STRENGTH, TONS PER SQ. FOOT

LOG OF BORING

PROJECT: Blowdown Water Pretreatment Pond
NASA

CLIENT: Bible Engineering Corporation
Houston, Texas

BORING NO. CB-6
FILE NO. 79-215
DATE 9/5/79

DRY AUGERED 0 TO 3 FEET
WASH BORED TO FEET

FREE WATER ENCOUNTERED YES NO

AT FT. DEPTH.

WATER AT FT. AFTER

SOIL SYMBOL	DEPTH (feet)	SAMPLES	Penetration Resistance (N) or TSF	Moisture Content %	Dry Density, PCF	Compressive Strength TSF	Failure Strain - %	ATTERBERG LIMITS Liquid LL	Plastic PL	Plasticity Index PI	DESCRIPTION OF STRATUM
	1										Medium to stiff tan & light gray CLAY (CH), slightly sandy
	2										
	3							54	20	34	
											Bottom @ 3 ft.

* SLICKENSIDED FAILURE
( ) CONFINING PRESSURE, PSI
G.S. GRAIN SIZE

PENETRATION RESISTANCE
(N) - STANDARD PENETRATION RESISTANCE (SPT)
TSF - POCKET PENETROMETER OR TORVANE ESTIMATED UNCONFINED COMPRESSIVE STRENGTH, TONS PER SQ. FOOT